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Noninvasive Brain Stimulation Improves Swallowing After Stroke

Allison Gandey

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March 24, 2011 — Stroke patients receiving electrical brain stimulation with swallowing exercises improved more than 2.5 points on a 7-point scale, report researchers.

The noninvasive technique, known as transcranial direct-current stimulation, uses a weak electrical current transmitted by electrodes placed on the scalp.

"Because brain stem swallowing centers have bilateral cortical innervations, measures that enhance cortical input and sensorimotor control of brain stem swallowing may be beneficial for dysphagia recovery," explain the investigators, led by Sandeep Kumar, MD, from Beth Israel Deaconess Medical Center and Harvard Medical School in Boston, Massachusetts.

The new pilot study showed swallowing ability improved in 86% of patients receiving stimulation and in 43% of those who did not. Although these percentages showed a trend toward improvement, they did not reach statistical significance.

The results are [published online](#) March 24 and will appear in the April issue of *Stroke*.

Difficulty swallowing or dysphagia is a common and serious complication of stroke and can lead to aspiration and pneumonia. The researchers studied 14 patients with subacute unilateral hemispheric infarction.

They randomly assigned 14 patients to anodal transcranial direct-current stimulation or sham stimulation. Patients received sensorimotor cortical representation of swallowing in the unaffected hemisphere over 5 consecutive days with concurrent standardized swallowing exercises.

The investigators measured the severity of dysphagia using a validated swallowing scale, the Dysphagia Outcome and Severity scale, before the first and after the last stimulation session.

Dr. Kumar and his team analyzed the effect of treatment in a multivariate linear regression model using changes in swallowing scale as the outcome variable. They adjusted for the effects of other potential confounding variables, such as the National Institutes of Health Stroke Scale and Dysphagia Outcome and Severity scale at baseline, acute ischemic lesion volumes, patient age, and time from stroke onset to stimulation.

They report improved swallowing in the patients receiving transcranial direct-current stimulation.

Table. Improvement in Dysphagia Outcome and Severity Scale

Stimulation	Improvement	P Value
Transcranial direct current	2.60	.019
Sham	1.25	.019

"Our results also attest to the feasibility and tolerability of transcranial direct current stimulation in this stroke subpopulation during early phases of stroke recovery," note the researchers.

The brain stimulation effect might be explained by an augmentation effect of the naturally occurring changes in the unaffected swallowing cortex, they acknowledge. "Combining the sensorimotor effects of swallowing maneuvers with simultaneous brain stimulation of the unaffected hemisphere may have been an important component of the



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effect."

The authors recommend additional studies to explore the effects of stimulation measures, frequency of stimulation, and timing of the intervention in improving swallowing in patients with stroke.

The National Institutes of Health and the Center for Integration of Medicine and Innovative Technology funded the study. The researchers have disclosed no relevant financial relationships.

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